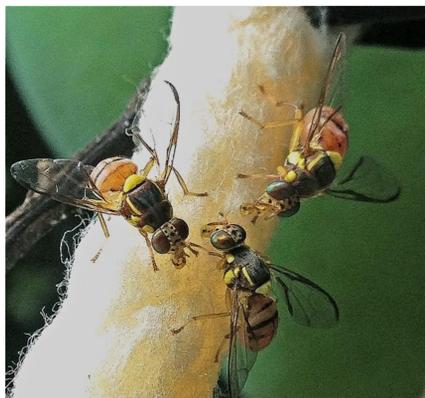




Protein deprivation, lure feeding, and mating success of male *Bactrocera dorsalis* and *B. cucurbitae*

Todd Shelly, USDA-APHIS, Hawaii, USA



B. dorsalis males on wick containing methyl eugenol

Background

- Males of *B. dorsalis* (oriental fruit fly) and *B. cucurbitae* (melon fly) respond to the lures methyl eugenol (ME) and cue lure (CL), respectively.
- *B. dorsalis* males show higher attraction to ME than *B. cucurbitae* males show to CL (Fig. 1).
- For both species, feeding on the lure boosts male mating success, but this effect is more persistent in *B. dorsalis* than in *B. cucurbitae* (Table 1)
- Exposure to the lures for 1 h (*B. dorsalis*) or 2 h (*B. cucurbitae*) did not lead to heightened mortality relative to non-exposed (control) males (Table 2).



B. cucurbitae males approaching drop of cue lure on guava leaf

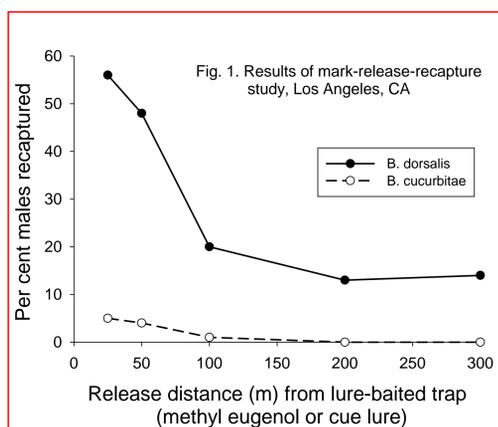


Table 1. Field cage results of mating competition between lure-fed versus non-lure-fed males. Values are percent of total matings obtained by lure-fed males as function of time elapsed after lure feeding. For *B. dorsalis*, all proportions were significantly greater than 50% (random mating), whereas for *B. cucurbitae* only proportions for days 1 and 3 deviated from random.

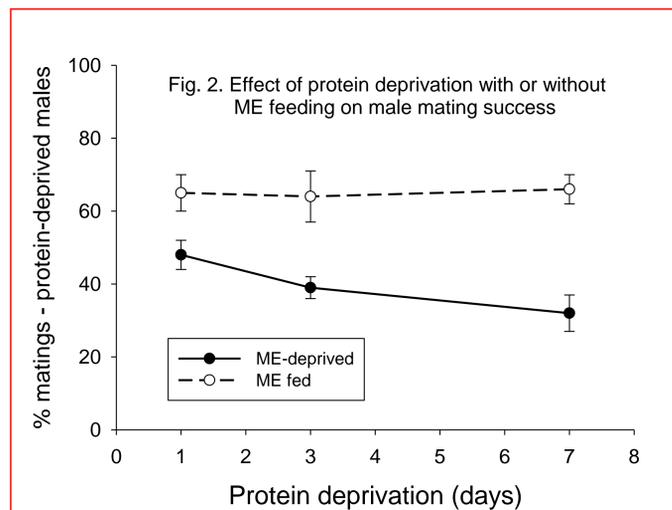
Time since lure feeding (days)	<i>B. dorsalis</i>	<i>B. cucurbitae</i>
1	64	63
3	65	58
7	64	49
14	65	50
21	66	---
35	65	---

Table 2. Effect of lure feeding on male mortality. *B. dorsalis* males were monitored for 1 week following ME feeding, and *B. cucurbitae* males were monitored for 4 weeks following CL feeding. For each species, N = 300 males per treatment category.

	% mortality	
	lure-fed	control (unfed)
<i>B. dorsalis</i>	9	10
<i>B. cucurbitae</i>	5	4

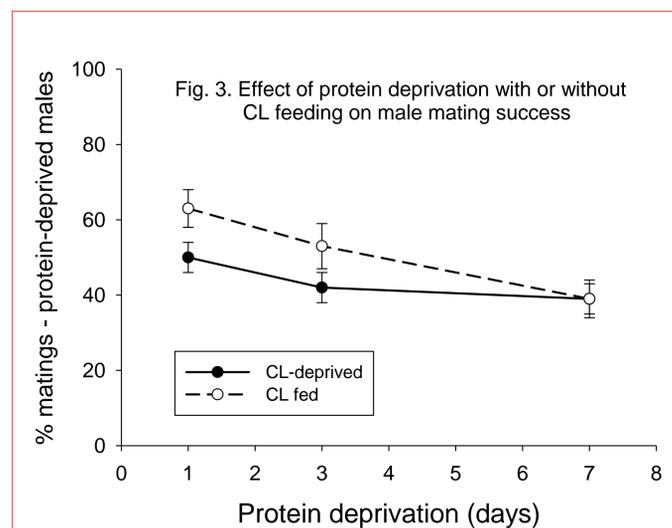
Prior work: *B. dorsalis*

- Males were fed a yeast hydrolysate:sugar mixture until testing or until 1, 3, or 7 d before testing at which time the full diet was replaced with a sugar only diet.
- In one set of tests, the protein-deprived males were deprived of ME as well and in another set of tests they were provided ME for 1 h on the day before testing.
- In field cage tests, protein-deprived males (with or without ME) competed against males fed full diet (without ME).
- Protein deprivation lowered male mating success, but ME compensated for this effect and conferred a mating advantage. All proportions for ME-fed males were significantly greater than 50% (random mating), while for ME-deprived males proportions for 3 and 7 d of protein deprivation were significantly lower than 50% (Fig.2).



Ongoing work: *B. cucurbitae*

- Using the same methods described above, do results from *B. cucurbitae*-CL association resemble those of *B. dorsalis*-ME?
- For males denied CL, protein deprivation of only 1 d had no effect on mating success relative to control males (full diet, no ME), but a sugar-only diet for 3 or 7 d resulted in significantly poorer mating performance compared to control males.
- For males given CL, a mating advantage over control males was evident after 1 day of protein deprivation, mating equivalence was noted after 3 d of sugar-only diet, and a mating disadvantage was observed after 7 d without protein.



Conclusions

- While data on the medfly are inconsistent, protein feeding appears critical for mating by *B. dorsalis* and *B. cucurbitae* males.
- In non-competitive tests in *B. dorsalis*, protein-deprived males still mate less than protein-fed males, suggesting lower signaling effort and mating effort by sugar-fed males.
- Feeding on male lures compensate for a poor diet, and this effect appears more pronounced for *B. dorsalis* than *B. cucurbitae*.